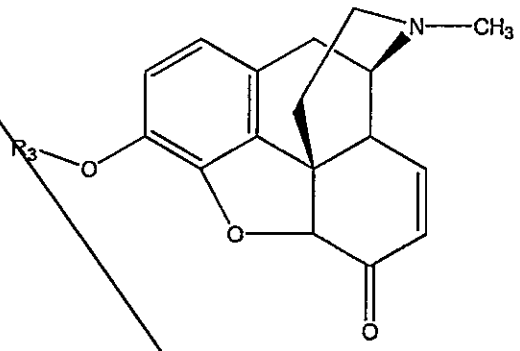
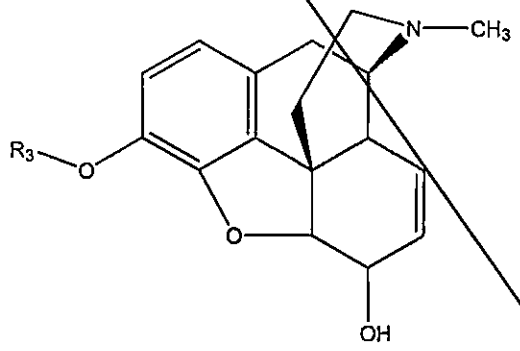
WHAT IS CLAIMED IS:

1. A method for making a compound of formula (II):



(II)

comprising, allowing a compound of formula (I):

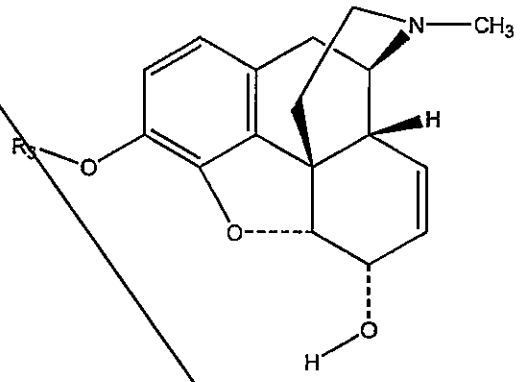


(I)

to react in the presence of a compound of formula R_1SR_2 and a chlorine-containing reagent selected from N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof and preferably is N-chlorosuccinimide, Cl_2, or any mixture thereof; under conditions sufficient to make the compound of formula (II); wherein

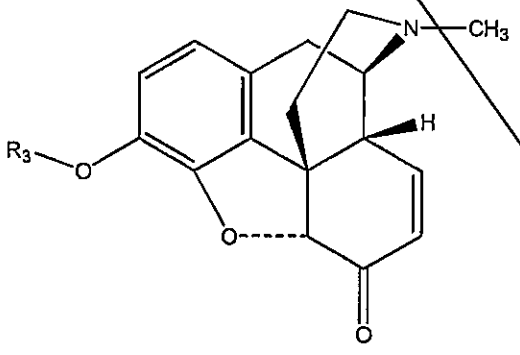
R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl; and R_3 is a protecting group.

2. The method of claim 1, wherein the compound of formula (I) is a compound of formula (Ia):



(Ia)

and the compound of formula (II) is a compound of formula (IIa):



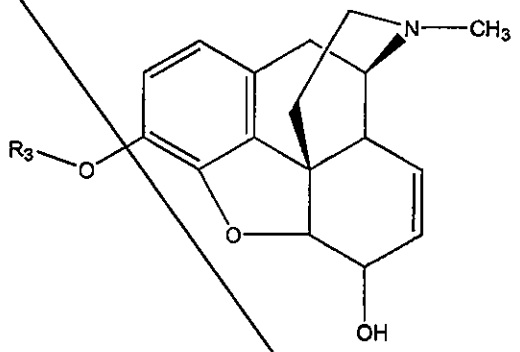
(IIa)

3. The method of claim 1, further comprising the use of a base.

4. The method of claim 3, wherein the base is an organic amine and preferably is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine and more preferably is triethylamine.

5. The method of claim 3, wherein the amount of base ranges from about 1.0 to about 15.0, from about 2.0 to about 10.0 or from about 2.5 to about 7.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

6. A composition comprising a compound of formula (I):



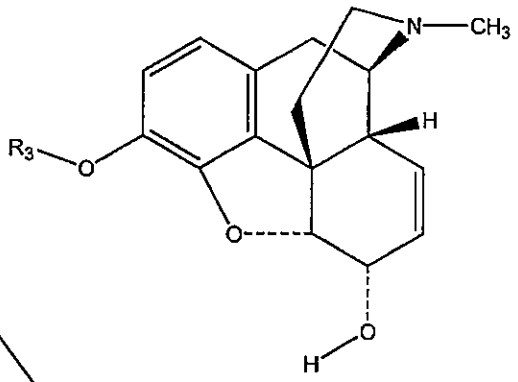
(I)

a compound of formula R_1SR_2 and a chlorine-containing compound selected from N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof and preferably is N-chlorosuccinimide, Cl_2, or any mixture thereof; wherein

R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl; and

R_3 is a protecting group.

7. The composition of claim 6, wherein the compound of formula (I) is a compound of formula (Ia).



(Ia)

8. The composition of claim 6, wherein R_3 is -(C_1-C_{10})alkyl, -benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl, -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), -P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or S(O)OC_6H_4-*p*-CH_3 and preferably R_3 is

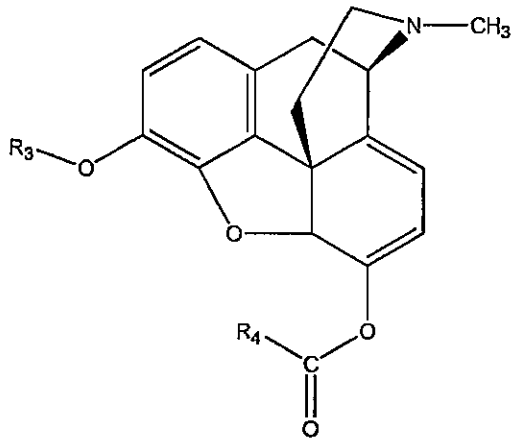
a) -CH_3; or

b) -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, or -Si(aryl)$_2$(C_1-C_{10})alkyl, and preferably is Si((C_1-C_{10})alkyl)$_3$; and more preferably is Si(CH_3)$_2$($C(CH_3)_3$).

9. The composition of claim 6 further comprising a base.

10. The composition of claim 6 further comprising an organic solvent.

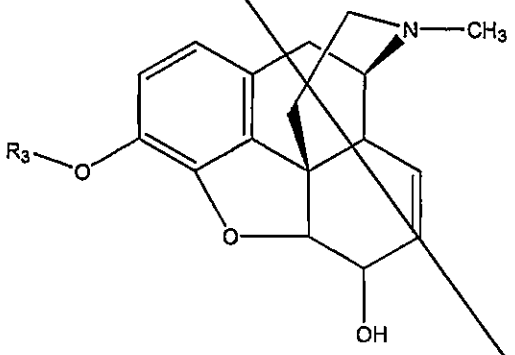
11. A method for making a compound of formula (III):



(III)

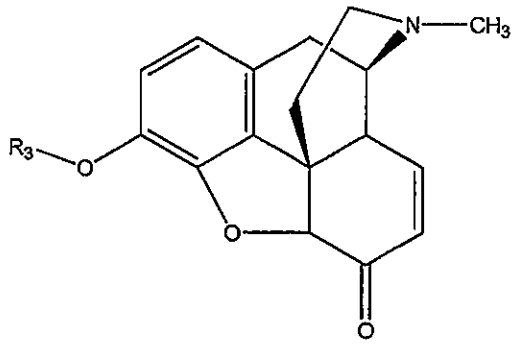
comprising:

(a) allowing a compound of formula (I):



(I)

to react in the presence of a compound of formula R_1SR_2 and a chlorine-containing reagent under conditions sufficient to make a compound of formula (II):



(II)

and

(b) allowing the compound of formula (II) to react with a first base and an acylating agent of formula $R_4(C(O)OC(O)R_4$ or $R_4C(O)X$ under conditions sufficient to make the compound of formula (III), wherein:

R_1 and R_2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl;

R_3 is a protecting group;

R_4 is -(C_1-C_{10})alkyl; and

X is -Cl, -Br or -I.

12. The method of claim 11, wherein R_3 is -(C_1-C_{10})alkyl, benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl, -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or -S(O)OC_6H_4-*p*-CH_3 and preferably R_3 is

a) -CH_3; or

b) Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)(C_1-C_{10})alkyl)$_2$ or -Si(aryl)$_2$(C_1-C_{10})alkyl and preferably is -Si((C_1-C_{10})alkyl)$_3$ and more preferably is -Si(CH_3)$_2$(C(CH_3)$_3$).

13. The method of claim 11, wherein the chlorine-containing reagent is trichloroisocyanuric acid, N-chlorosuccinimide, sodium dichloroisocyanurate, 1,3-dichloro-

5,5-dimethylhydantoin, Cl_2, calcium hypochlorite, or any mixture thereof and preferably is trichloroisocyanuric acid.

14. The method of claim 11, wherein the amount of the compound of formula (I) ranges from about 1.0 to about 9.0, form about 2.0 to about 5.0 or from about 2.0 to about 4.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

15. The method of claim 11, wherein R_1 is $-CH_3$ and R_2 is $-(C_1-C_{20})$alkyl, and preferably R_1 is $-CH_3$ and R_2 is $-(C_{12})$alkyl.

16. The method of claim 11, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0, from about 2.0 to about 5.0 or from about 2.5 to about 3.5 molar equivalents per molar equivalent of the chlorine-containing reagent.

17. The method of claim 11, wherein step (a) further comprises the use of a second base.

18. The method of claim 17, wherein the second base is an organic amine, and preferably is triethylamine, diisopropylethylamine, pyridine, diemethylpyridine or dimethylaminopyridine and more preferably is triethylamine.

19. The method of claim 17, wherein the amount of second base ranges from about 1.0 to about 15.0, from about 2.0 to about 10.0 or from about 2.5 to about 7.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

20. The method of claim 11, wherein the first base is an organic amine, and preferably is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylaminopyridine, and more preferably is triethylamine.

21. The method of claim 11, wherein the acylating agent is

a) $R_4C(O)OC(O)R_4$ and preferably is $-CH_3C(O)OC(O)CH_3$; or

b) $R_4C(O)X$, and preferably is $CH_3C(O)X$ and more preferably is $CH_3(C(O)Cl$.

22. The method of claim 11, wherein the amount of the first base ranges from about 1 to about 10, from about 2 to about 7 or from about 3 to about 6 molar equivalents per molar equivalent of the acylating agent.

23. The method of claim 11, wherein the amount of the acylating agent ranges from about 1 to about 15, from about 1 to about 10 or from about 2 to about 7 molar equivalents per molar equivalent of the compound of formula (II).

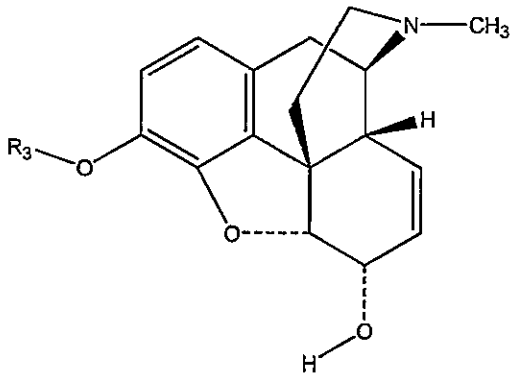
24. The method of claim 11, wherein the first base and the second base are the same.

25. The method of claim 11, wherein

I. step (a) further comprises isolating the compound of formula (II) prior to carrying out step (b); or

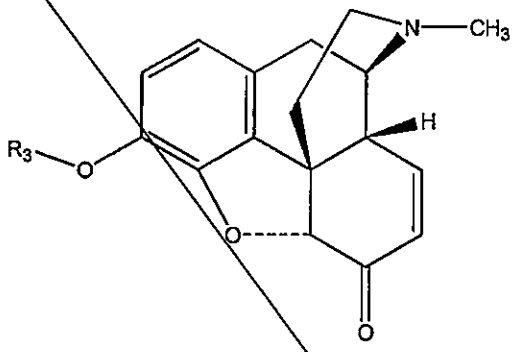
II. step (b) is carried out without first isolating the compound of formula (II) prepared in step (a).

26. The method of claim 11, wherein the compound of formula (I) is a compound of formula (Ia):



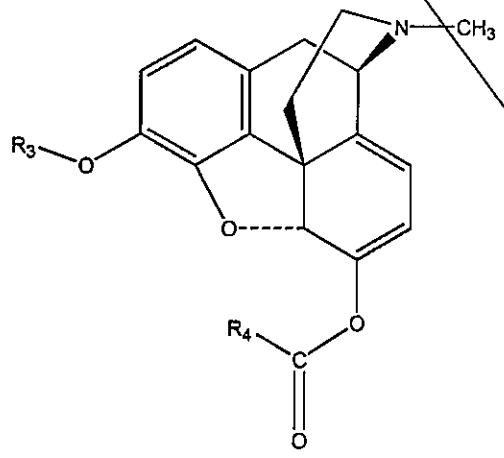
(Ia),

the compound of formula (II) is a compound of formula (IIa):



(IIa),

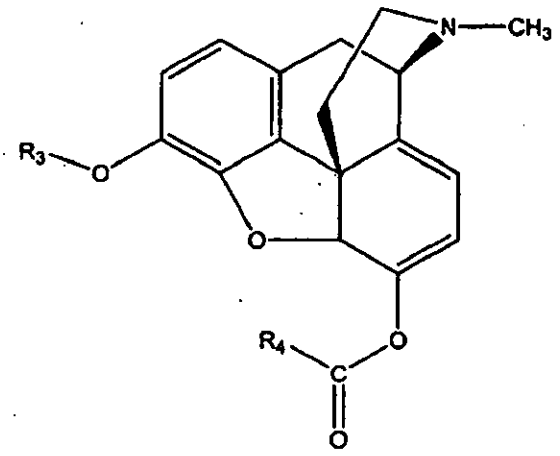
and the compound of formula (III) is a compound of formula (IIIa):



(IIIa).

CLAIMS

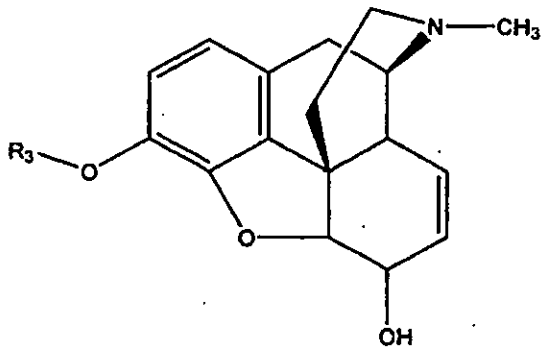
1. A method for making a compound of formula (III):



(III)

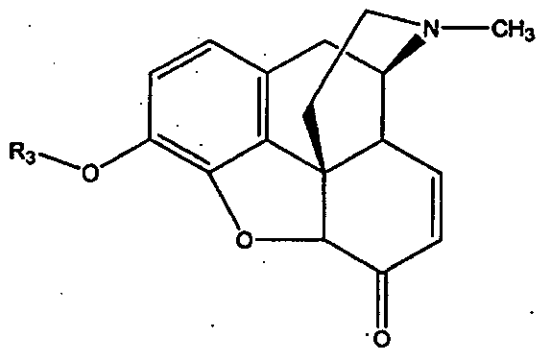
comprising:

(a) allowing a compound of formula (I):



(I)

to react in the presence of an admixture of a compound of formula R_1SR_2 and trichloroisocyanuric acid, under conditions sufficient to make a compound of formula (II):



(II)

and

(b) allowing the compound of formula (II) to react with a first base and an acylating agent of formula $R_4(C(O)OC(O)R_4$ or $R_4C(O)X$ under conditions sufficient to make the compound of formula (III), wherein:

R_1 and R2 are each independently -(C_1-C_{20})alkyl, -(C_3-C_8)cycloalkyl or -phenyl;
R_3 is a protecting group;
R_4 is -(C_1-C_{10})alkyl; and
X is -Cl, -Br or -I.

2. The method of claim 1, wherein R_3 is -(C_1-C_{10})alkyl, benzyl, -C(O)(C_1-C_{10})alkyl, -C(O)O(C_1-C_{10})alkyl, -Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)((C_1-C_{10})alkyl)$_2$, -Si(aryl)$_2$((C_1-C_{10})alkyl), P(O)((C_1-C_{10})alkyl)$_2$, -P(S)((C_1-C_{10})alkyl)$_2$, or -S(O)OC_6H_4-*p*-CH_3 and preferably R_3 is

a) -CH_3; or
b) Si((C_1-C_{10})alkyl)$_3$, -Si(aryl)(C_1-C_{10})alkyl)$_2$ or -Si(aryl)$_2$(C_1-C_{10})alkyl and preferably is -Si((C_1-C_{10})alkyl)$_3$ and more preferably is -Si(CH_3)$_2$(C(CH_3)$_3$).

3. The method of claim 1, wherein the amount of the compound of formula (I) ranges from about 1.0 to about 9.0, from about 2.0 to about 5.0 or from about 2.0 to about 4.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

4. The method of claim 1, wherein R_1 is $-CH_3$ and R_2 is $-(C_1-C_{20})$alkyl, and preferably R_1 is $-CH_3$ and R_2 is $-(C_{12})$alkyl.

5. The method of claim 1, wherein the amount of the compound of formula R_1SR_2 ranges from about 1.0 to about 9.0, from about 2.0 to about 5.0 or from about 2.5 to about 3.5 molar equivalents per molar equivalent of the chlorine-containing reagent.

6. The method of claim 1, wherein step (a) further comprises the use of a second base.

7. The method of claim 6, wherein the second base is an organic amine, and preferably is triethylamine, diisopropylethylamine, pyridine, diemethylpyridine or dimethylaminopyridine and more preferably is triethylamine.

8. The method of claim 6, wherein the amount of second base ranges from about 1.0 to about 15.0, from about 2.0 to about 10.0 or from about 2.5 to about 7.0 molar equivalents per molar equivalent of the chlorine-containing reagent.

9. The method of claim 1, wherein the first base is an organic amine, and preferably is triethylamine, diisopropylethylamine, pyridine, dimethylpyridine or dimethylamino-pyridine, and more preferably is triethylamine.

10. The method of claim 1, wherein the acylating agent is

a) $R_4C(O)OC(O)R_4$ and preferably is $-CH_3C(O)OC(O)CH_3$; or
b) $R_4C(O)X$, and preferably is $CH_3C(O)X$ and more preferably is $CH_3(C(O)Cl$.

11. The method of claim 1, wherein the amount of the first base ranges from about 1 to about 10, from about 2 to about 7 or from about 3 to about 6 molar equivalents per molar equivalent of the acylating agent.

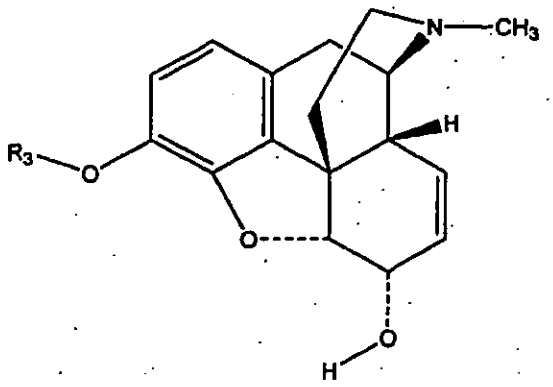
12. The method of claim 1, wherein the amount of the acylating agent ranges from about 1 to about 15, from about 1 to about 10 or from about 2 to about 7 molar equivalents per molar equivalent of the compound of formula (II).

13. The method of claim 1, wherein the first base and the second base are the same.

14. The method of claim 1, wherein

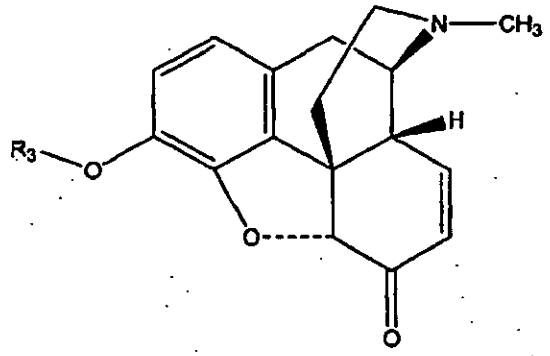
I. step (a) further comprises isolating the compound of formula (II) prior to carrying out step (b); or
II. step (b) is carried out without first isolating the compound of formula (II) prepared in step (a).

15. The method of claim 1, wherein the compound of formula (I) is a compound of formula (Ia):



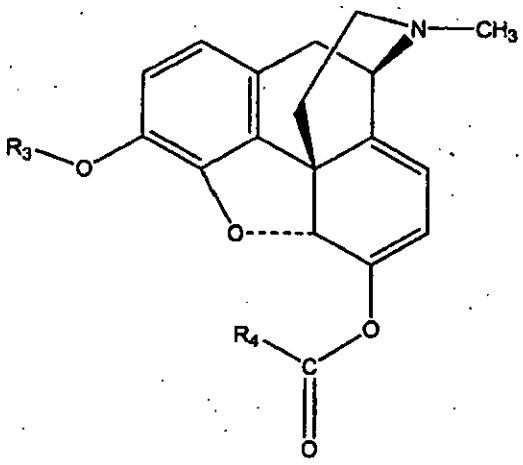
(Ia),

the compound of formula (II) is a compound of formula (IIa):



(IIa),

and the compound of formula (III) is a compound of formula (IIIa):



(IIIa).